UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

NOVEMBER 1945

EROSION CONTROL PRACTICES DIVISION

Weeping Lovegrass Grazing Test - J. B. Pope, Tyler, Texas.-"Dry dairy cattle and mules were turned on first season's growth weeping lovegrass on November 15. The grass was first choice by the mules and third choice by the dairy cattle. It was the third day before the cattle started grazing the lovegrass. They had a choice of Bermuda and green crab grass which were eaten almost exclusively the first two days. On the third day, they ate the weeping lovegrass and seemed to like it. Both cattle and mules ate the fertilized area first. One-half of the area had received a top dressing of 100 pounds of nitrate of soda per acre applied the middle of August. The fertilized area was grazed to the ground before the unfertilized area was eaten."

Six Years of Records in Grant County, Wisconsin Show Economic Advantage of Conservation Farming - H. O. Anderson, LaCrosse, Wisconsin.-"Definite conclusions as to the economic effects of a soil conserving program upon farm production and income can be drawn from the study of 1939-44, Grant County farm records.

"Crop yield increases were 7 per cent greater on soil conserving farms than on farms without definite soil conserving programs or for Grant County. This figure is conservative because the records for this study were started after some of the initial increases in yields had been obtained.

"Crop rotation recommendations in soil conservation plans were followed rather closely at first, but the acreage of row crops increased and of hay crops decreased during the five-year period.

"The value of livestock production increased about 85 per cent on both soil conserving and non-soil conserving farms. The increase on a per acre basis, however, was larger on the soil conserving farms. That is the logical result of differences in crop yield increases. Butterfat and egg production increases were substantial on soil conserving farms, whereas, the production of these commodities decreased on non-soil conserving farms. Hog production increases, however, were larger on the latter farms.

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**All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Group of farms	Increased production, 1942-44 over 1939-1941		
	Butterfat	Hogs	Eggs
	Pct.	Pct.	Pct.
Soil conserving farms.....	12	19	45
Non-soil conserving farms..	- 1	30	- 1

"On the per acre basis, net farm earnings (net returns to the farm operator and to capital) increases were 8 per cent larger on the soil conserving farms than on the non-soil conserving farms.

"Ten per cent higher yields were obtained on farms with higher land-use capability ratings. Yield data on different land-use capability levels are useful in estimating production possibilities on land of different qualities.

"Dairying, which requires a relatively large supply of labor and soil conserving crops, increased 16 per cent on the smaller farms and only 8 per cent on the larger farms. On the other hand, hog production on these farms increased 14 per cent and 21 per cent, respectively. Knowledge of characteristic differences in the relative importance of efficiency factors such as feeding efficiency, labor efficiency, crop yields, butterfat production per cow is necessary for sound planning of both the larger and the smaller farms.

"Sixteen out of the 36 farms studied used grass silage at one time or another. Twelve of them used grass silage in 1940 but all but two of them had discontinued filling the silos with legume-grass mixtures in 1944. Much of the surplus hay problem would disappear on these dairy farms if satisfactory methods of harvesting and utilizing grass silage are further developed."

Contour Planted Corn and Soybeans Field Tested - D. D. Smith, Columbia, Missouri.-"The average yield of contour-planted corn on the 6 field tests was 66.9 bushels per acre, or 13.2 bushels more than that planted up and down slope. On one Knox soil field the contour yield was more than double that planted up and down hill. This was due to the difference in stand, as a result of washing out of the up and down hill planted corn. A decrease in yield with contouring was recorded on a Putnam soil field. Here the prolonged saturation of the soil after planting resulted in poorer germination on the contour than on the up and down hill planted corn.

"Only a very small increase in yield of contour-planted soybeans was obtained on the 4 tests harvested this year. The contoured beans averaged 8.4 bushels per acre in comparison to 8.1 bushels when planted up and down hill. At McCredie, grasshopper damage resulted in a zero yield on all of the drilled plots.

Beef Cattle Gains in Grazing Study Plots.-"Yearling Hereford heifers and steers were used on the grazing study plots in 1945. Production for the year was as follows:

Vegetation	Production per acre	
	Beef	Animal days
	Pounds	
Wheat-lespedeza	238	165
Timothy-lespedeza	193	162
Timothy-lespedeza-one year sweet clover	192	164
Barley-(soybeans for hay)	85	50
(Oats for hay)-lespedeza	76	79
Bluegrass renovated	162	164
Bluegrass - check area	145	129
Bluegrass - contour furrowed	121	141

Increased Yield from Stubble Mulch Tillage in Southeast Idaho - Hugh C. McKay, St. Anthony, Idaho.-"The yield data obtained this year from the stubble mulch field trials started in 1944 in the southeastern part of the State are very encouraging. Some of the yields and differences are outstanding as shown in the following table:

"1945 Yields from Stubble Mulch Field Trials

Location	Stubble mulch trials	Check fields
Lava Hot Springs, Idaho	47.1*	41.1*(M)
Harper Farm	51.7	39.6 (M)
Grace, Idaho		
M. E. Sorenson	30.7	21.5 (M)
Young Brothers	33.6	33.9 (O)
Smith Farm	30.4	28.3 (M)
Montpelier, Idaho		
Jack Crane	33.6	25.4 (M)
Marvin E. Clark	36.4	32.1 (M)
Downey, Idaho		
Bailey Brothers	37.7	37.1 (O)
England Farm	27.9	24.9 (O)
Criddle Farm	30.6	20.4 (O)
Brim Farm	23.8	19.5 (O)
Average	33.6	28.3

*Yields are for barley, not included in average. All other yields are for wheat. The stubble mulch trials were from 20 to 50 acres in size.

"All but two of the stubble mulch trials were completed with the Dempster sweep machine. The other two were tilled with the modified moldboard plow. In the check plots both the moldboard and oneway disk plows were used depending upon what the farmer was using. '(M)' following the yield means moldboard plow and the '(O)' means oneway disk.

"In all but two trials the stubble mulch tillage yielded considerable more than the check plots. On the Young Brothers farm at Grace, Idaho the check plot yielded .3 bushel more than the stubble mulch trial. The other exception was the Bailey Brothers farm at Downey, Idaho where stubble mulch tillage yielded only .6 bushel more than the check.

"The average yield for the stubble mulch plots was 33.6 bushels per acre as compared to 28.3 bushels for the check plots. This is a difference of 5.3 bushels in favor of the stubble mulch tillage.

"This difference in yield and the consistence with which the stubble mulch trials outyielded the check plots is quite important because the trials covered quite a large number of soil, slope and climatic conditions. This would indicate that stubble mulch tillage when properly handled will not only help control erosion, but will equal or give an increased yield over the present tillage practices."

Effect of Cover on Soil Properties and Infiltration - Joel E. Fletcher, Tucson, Arizona.-"In continuing the study of the effect of various cover crops on various soil properties at the University of Arizona's Valley Citrus Farm, the following numbers of minutes were required for a 4-inch irrigation to just disappear from the surface:

Crop	Time in minutes for 4-inch irrigation
Alfalfa	290
Rhodes grass	700
Bermuda grass	465
Johnson grass	470
Young Giant Panic	900
Oil sprayed	920
Clean cultivated	970
13 tons manure, 3 weeks earlier	510

"Notwithstanding the fact that the alfalfa plot has the highest infiltration rate it is also the hardest, while the manured plot is the fourth from the best in infiltration and the softest. Bermuda grass and Johnson grass covers both have good infiltration and are soft."

Reduction in Oak Sprouts by Clearing and Mowing - Harley A. Daniel, Guthrie, Oklahoma.-"The number of sprouts remaining in 1945 on various areas cleared of scrubby oak on the Guthrie Station in 1935 and 1943 has been determined. The percentage of original sprouts remaining on areas with differences in original density of brush and in number of years mowed after clearing is as follows:

Density of brush	Year land cleared	Treatment or number of years mowed	Per cent remaining in 1945
Light 1/.....	1935	10	8.5
Light.....	1935	8	11.1
Light.....	1943	2	44.7
Light.....	1943	Unmowed	58.3
Medium 2/.....	1943	1	87.2

1/ Light density brush before clearing approximately 22,200 shrubs per acre, 2 inches or less in diameter at 1 foot above the ground level.

2/ In addition to approximately 17,000 shrubs per acre of the above description, there were 198 trees ranging in diameter from 4 to 8 inches at breast height. The stumps from the trees provide a greater root reserve for sprouts than the shrub stubs.

An Effective Method of Seeding Winter Cover on Tobacco Land - T. L. Copley, Raleigh, North Carolina.-"An observational experiment included the seeding of winter cover over the old tobacco beds, with minimum soil preparation. Results have been particularly promising when seed could be uniformly distributed and covered. The contour ridges, together with the surface residue and the growing winter cover provides excellent surface protection and reduces winter erosion to a minimum. This fall four terrace intervals, totaling about 4 acres, were seeded to a rye winter cover in this manner. The only soil preparation was with a stalk cutter, which chopped the row ridges while cutting the tobacco stalks. Rye was seeded with a grain drill along the rows and followed with a flexible rotary hoe to aid in covering the seed. Twenty pounds of nitrogen was applied at seeding. The rye now looks excellent with a good stand and cover over both the row beds and middles. Any runoff must filter through the winter cover and the undisturbed surface residue along the row middles. Altogether, it looks very effective as a control measure and takes care of the vulnerable fall period during the establishment of the winter cover. This method also preserves the row layout pattern and enables it to be easily followed the next year."

Improvement of Subsurface Tillage Tools - F. L. Duley, Lincoln, Nebraska.-"Further tests have been conducted on the effectiveness of different types of subsurface tillers in pulverizing the soil. The Noble tiller with 54-inch sweeps having more curvature and with the convex side up seems to give a pulverizing effect on the soil more nearly comparable with plowing than any other tiller we have used. A special blade that Mr. Noble has built for the Ford tractor also does very good work. We are now cooperating with the Auburn, Alabama tillage laboratory on the possibility of using a sweep of this or similar design on other types of subtillage machines. The Minneapolis-Moline has built a new type standard and frog for their sweeps which appears to be a decided improvement over their old design."

Effect of Tillage Methods on Protein Content of Wheat.-"The effect of tillage methods on the protein content of wheat was determined for a number of treatments this year. The results are as follows:

Field	Tillage	Disposition of residue	Fertilizer	Mean per cent protein	Yield, bushels per acre
Rotation	Plowed	No residue	None	10.32	38.6
Corn,	Plowed	Residue under	None	10.68	40.3
oats,	Subtilled	Residue on surface	None	11.00	39.7
and	Plowed, late	Residue under	None	10.73	38.4
wheat	Subtilled	Residue on surface	None	10.75	40.3
Wakelin	Plowed	Residue under	Nitrogen*	13.00	50.3
Field	Plowed	Residue under	None	12.10	45.7
Fallow	Subtilled	Residue on surface	Nitrogen*	13.20	50.4
	Subtilled	Residue on surface	None	12.43	46.5
	Plowed	Residue under	Manure	12.14	48.2
	Plowed	Residue under	None	11.34	45.9
	Subtilled	Residue on surface	Manure	11.40	47.8
	Subtilled	Residue on surface	None	11.16	43.0

*40 pounds of nitrogen as ammonium nitrate applied per acre in spring."

Need for Changed Land Use of Impervious Soils in Northeastern Illinois - Elmer L. Sauer, Urbana, Illinois.-"At the present time, approximately 65 per cent of the cropland in this area is in intertilled crops (corn and soybeans), 20 per cent in small grains and only 15 per cent in legumes and grasses. Recommended long-time use of the cropland would permit a maximum of 49 per cent in intertilled crops, and call for a minimum of 23 per cent in small grains and 28 per cent in legumes and grasses. For an average 160-acre farm this adjustment would mean a decrease of 25 acres of corn and soybeans, an increase of 5 acres of small grains and an increase of 20 acres of legumes and grasses.

"Before the increase in legumes and grasses is possible, the land will need limestone and phosphate so that it will grow legumes. Soil treatment plus needed practices will cost from $18.00 to $30.00 per acre. The farms are poor and farmers haven't the funds to do the job. Credit is needed to provide capital to get this job done. Ways and means of getting the needed soil treatment and practices applied are being studied at present."

Need New Type of Potato Digger Shovel - J. W. Slosser, Orono, Maine.-"In a discussion of equipment problems of the area it was agreed that the potato digger was still the major problem. The most critical features which demand attention are listed below:

"1. The digger splits the row in such a manner that a considerable number of potatoes roll out or are pushed out the edge of the blade and are run over by the digger wheels or covered. This is particularly true when operating cross-slope. The level-bed digger developed on the project did not overcome this feature, but did reduce bruising and enabled digging on slopes to 18 per cent.

"2. High cost of frequent replacement of conventional digger apron. The excessive wear is caused by the necessity, under the present design, of the apron's traveling against the undisturbed earth under the shovel.

"3. Present diggers do not allow for modification or adaptation as harvesters.

"As a result of the discussions an effort is being made to construct a type of potato digger shovel which will not split the potato row. The design calls for delivery of potatoes and earth to the separating apron by conveyor belt. This should reduce tuber losses to a minimum, and at the same time, reduce wear on the rather expensive aprons now in use."

Moisture Content of Various Textures of Sassafras Soil at Specified Tensions - Oren R. Neal, New Brunswick, New Jersey.-"Soil samples were collected by R. K. Craver to be used in correlating survey techniques with laboratory data. Preliminary data on a set of samples of Sassafras soil representing different textural classes have been obtained as follows:

Sample number	Mechanical analysis			Moisture content at given tension values			
	Sand	Silt	Clay	10 cm water	30 cm water	80 cm water	10 atmos.
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
1	47	35	18	35	30.5	24	7.1
3	69	19	12	27	17	14	4.8
4	50	36	14	35	31.4	29	-
5	32	48	20	33	29.5	27	-
*	83	7	10	30	25	15	5.3

*Data on the Collington soil from Marlboro is added for comparison."

Record Grain Sorghum Yields at Garden City, Kansas -Alvin E. Lowe, Garden City, Kansas.-"The sorghum plots on the basin project were combine harvested early in November and the yields are given in the following table. The average yield of the twelve basin project sorghum plots this year was 36.2 bushels per acre which is the largest on record. The highest previous yearly average was 32.0 bushels per acre, obtained in 1941.

"The trouble experienced in obtaining stands on the plots planted with the basin lister were overcome by surface planting and the yields for 1945 clearly prove it. However, the averages still reflect this stand trouble of previous years.

"The fallow plots were better than the continuous plots but not so much better as usual. The continuous plots had moisture left in the soil at harvest time a year ago and so their yields are unusually high.

"The usual differences in favor of contouring as compared to farming up and down the slope were obtained this year. The six-year average of all the contour sorghum plots was 21.4 bushels per acre as compared with the six-year average of all the non-contour sorghum plots of 17.0 bushels per acre; a difference of 4.4 bushels per acre, or 26 per cent.

Sorghum grain yields in bushels per acre for the Basin Project Plots at Garden City, Kansas, 1945, and average of the last 6 years

Cultural treatment	1945	6-year
44-inch listed rows, continuously cropped		
Basined on contour	49.5	20.8
Ordinary list on contour	47.7	26.0
Basined up and down slope	37.2	16.9
Ordinary list up and down slope	24.2	16.2
88-inch listed rows, continuously cropped		
Basined on contour	27.5	14.3
Ordinary list on contour	26.2	16.1
Basined up and down slope	24.2	13.6
Ordinary list up and down slope	26.3	13.1
44-inch listed rows, one year fallow		
Basined on contour	53.6	26.8
Ordinary list on contour	34.2	24.6
Basined up and down slope	45.1	21.6
Ordinary list up and down slope	38.3	20.7
Average of the above listed three groups of treatments		
Basined on contour	43.5	20.7
Ordinary list on contour	36.0	22.2
Basined up and down slope	35.5	17.4
Ordinary list up and down slope	29.6	16.7
Average	36.2	19.2

Kudzu and Sericea Furnish Supplemental Grazing for Dairy Cattle - B. H. Hendrickson, Watkinsville, Georgia.-"Kudzu and sericea lespedeza helped materially to reduce costs and make a success of the milk project of Raymond Dawson of Watkinsville, Oconee County, Georgia in 1945. Mr. Dawson, operator of the 100-acre Experiment Farm Unit on the Southern Piedmont Conservation Experiment Station, sold 33,811 pounds of milk from 6 cows for $1,245.00 in 1945.

"During certain periods of the year permanent pastures suffer from drought. Although the total 1945 rainfall at Watkinsville was about normal, during May and June it totaled only 3.4 inches which was less than half normal. Likewise, there was a shortage of rainfall during July, August, and October. During these 5 months the 10-acre grass-clover pasture was inadequate for the 9 cows.

"On May 25, when the permanent grass pasture began to dry up, his 8 cows were turned on 8 acres of sericea lespedeza, and had free access to the sericea and permanent grass throughout the summer and fall. Dawson estimates that fully 50 per cent of the grazing during this period was obtained from the sericea lespedeza. The sericea was not heavily grazed and 260 pounds of seed per acre were harvested later on in the fall.

"Since the grass pasture and sericea lespedeza were grazed down by early July, the 9 cows were turned to grazed on 7.5 acres of kudzu and remained on the kudzu for a couple of weeks, when rains came in late July which improved the grass and sericea pastures. On October 19, when the milk flow began to drop, 11 cows were returned to the kudzu. Adequate grazing was provided until November 19, when the cows were removed to a field of volunteer oats in Kobe lespedeza hay stubble.

"The 7.5 acres of kudzu provided 144 animal days of grazing in July and 341 during October and November or a total of 64 animal days per acre. The kudzu was killed by frost on November 5, but was grazed until consumed two weeks later.

"The cows maintained a normal milk flow while on the kudzu. There was no noticeable increase in butterfat content during the short two weeks July grazing of kudzu, but the butterfat percentage was considerably higher during the 4-week grazing period in October and November, as shown by the following production figures:

Grazing period	Pounds milk producted	Per cent butterfat	Amount received for milk
Four weeks prior to grazing kudzu....	2,963	5.18	$107.39
Four weeks grazing kudzu in October..	2,977	5.75	119.78
Increase.....	14	.57	12.39

"Supplemental winter grazing is supplied by pasturing a portion of the early planted oats on his cropland fields, and also by crimson clover in the Bermuda grass-Dallis grass pasture. Kobe lespedeza hay, crushed grains, and cotton seed meal - all produced on the farm - complete the year-around dairy cattle feed program on this farm.

"Kudzu and sericea lespedeza, produced on poor eroded land, served as good insurance against a declining milk flow during summer and fall droughts and likewise provided a cheap source of highly nutritious feed."

Contour Field Trials in Iowa - G. M. Browning, Ames, Iowa.- "Studies were continued this year comparing the effect of contouring versus up-and-down hill plantings on the yield of corn in cooperation with 16 farmers in 5 Soil Conservation Districts. As an average of 7 fields in Eastern Iowa on Tama and Carrington soils there was an average increase of 8.7 bushels in favor of contouring. In Western Iowa on 9 farms representing Mills and Ida soils the average increase in favor of contouring was 25.8 bushels. The large decrease in yield on the up-and-down hill areas in western Iowa may be largely explained by the 30.5 per cent decrease in stand which resulted from washing out of corn in the lister furrows during heavy rains which occurred in that area bout the middle of May.

"Data on the effect of contouring on yields are available on 153 fields of corn during 1942-45, 79 fields 1942-44, and 21 fields of oats 1943-44. As an average of all fields, contouring has increased the yields of corn 7.4 bushels per acre, soybeans 2.7 bushels per acre, and oats 5.4 bushels per acre. In other words, on the average, contouring has increased the yields of corn 10.3 per cent, soybeans 11.4 per cent, and oats 11.4 per cent.

Effect of Cover Crops and Tillage Methods on Soil Aggregation - T. C. Peele, Clemson, South Carolina.-"Determinations of the influence on soil aggregation of the different tillage methods used with corn following winter legumes were made in September. The data from these determinations together with results of analyses made in August 1943 are summarized in the following table. The first corn crop was grown in 1943, while the data for 1945 are the results after 3 successive corn crops. The decrease in aggregation from about 40 to about 28 on the clean-tilled plowed plot without cover crops has been accompanied by an increase in erodibility as indicated by runoff and erosion measurements being made on these plots.

Tillage method	Preceding cover crop	Degree of aggregation		
		August 8, 1943		Sept. 11,1945
		0-1" depth	1"-4" depth	0-5" depth
Mulch-disk method...	Vetch and rye	41.0	39.6	42.1
Mulch-balk method...	Vetch and rye	37.1	36.8	47.1
Clean tillage,plowed	Vetch and rye	36.3	36.4	33.9
Mulch-disk method...	Crimson clover	39.2	35.5	38.8
Mulch-balk method...	Crimson clover	34.7	35.3	39.4
Clean tillage,plowed	Crimson clover	38.2	37.7	31.5
Clean tillage,plowed	None	41.1	40.2	28.0

No Yield Difference with Subsurface Tillage - C. L. Englehorn, Fargo, North Dakota.-"Nine field trial yield comparisons between spring plowing and spring subsurface tillage are available. In five of these comparisons subsurface tillage outyielded plowing. As an average of the nine comparisons, subsurface tillage yields 0.7 bushel more than plowing. The difference is not significant.

"Based on the total data, subsurface tillage yields as well as plowing. This has been the tendency during the last few years on the replicated plots at the Experiment Station Substation at Edgeley. If this tendency continued with further trial, the choice between subsurface tillage and plowing can be made on basis of advantages other than yield. Subsurface tillage may be preferable, not due to its effect on yield, but due to the fact that the plant residue which it leaves on the surface of the soil protects it against erosion losses."

Forty Year Contour Peach Orchard - John T. Bregger, Clemson, South Carolina.-"Austell, Georgia appears to the place where the first peach orchards of the State were planted about 1880. At this early period, most fruit trees were mulched with 'pine straw' instead of being cultivated. The first terraces in this part of Georgia were constructed about 1895 when a few orchards were also planted on the contour. The second oldest peach district where contouring continued until the present day is located about a hundred miles south of Austell on the north end of Pine Mountain. The oldest contour orchard in this area is now almost 40 years old and is still producing large crops of peaches.

Intensity of Grazing Studies - Oscar K. Barnes, Laramie, Wyoming.- "The utilization data for the rate of use study shows the differences in amount of grass left at the end of the grazing season following light, moderate, and heavy grazing. The significant points with these data will be the effect of these different quantities of vegetation left each year on future production. Animal gains associated with these rates of use are shown also in the following table:

Degree of grazing	Sheep days per acre	Gain per head		Total gain per acre	Grass left at end of season		
		Ewes	Lambs		Short grass	All other grass	Total
		Lbs.	Lbs.	Lbs.	Lbs. per acre		
Light.....	36	27	52	29	228	106	334
Moderate...	61	34	53	48	201	76	277
Heavy.....	92	23	48	62	108	43	151

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies, Washington, D. C.-The motion picture entitled "Raindrops and Soil Erosion", which Mr. Ellison has been working on in cooperation with the Division of Information, has recently been completed. It is a color film consisting of two reels and has a sound track. Two copies are available in the Washington office at the present time and one copy will be placed in each region about the middle of February. This picture has already been shown at staff and seminar meetings in the Service as well as to one Department meeting where a number of the bureaus were represented and it has been very favorably received. It is believed that Research personnel will want to make arrangements to get this film from the Regional offices at an early date.

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Rain or snow fell on 15 days of the month in amounts ranging from 0.01 inch to .63 inch with a total for the month of 3.45 inches. Total rainfall for the 11 months starting January 1, 1945, is 44.14 inches as compared to 28.14 inches for the same period in 1944.

"Some runoff was recorded from several of the small watersheds since the soil was well saturated most of the time. Soil losses were very low, ranging from 2 to 7 pounds per acre.

"Soil and air temperatures dropped considerably during the month. Temperatures at 5:00 p.m. for November 1 and November 30 with the corresponding drop in soil temperature at different depths are given in the table below. The drop in soil temperatures is much more pronounced on the cultivated land (corn ground seeded to winter wheat)."

Summary of Soil Temperature Data for November, 1945

Date	Land Use	Temperatures in F° at 5:00 p.m.					
		Canopy	Soil depth				
		2 Ins.	1/2 In.	3 Ins.	6 Ins.	12 Ins.	24 Ins.
Nov. 1	Woodland (Watershed 131)	64	59	56	51	54	54
Nov. 30	"	29	44	42	40	44	44
Difference		35	15	14	11	10	10
Nov. 1	Wheat (Watershed 109)	64	57	51	51	51	53
Nov. 30	"	35	28	33	34	35	41
Difference		29	29	18	17	16	12

The above table was taken from Mr. Harrold's report.

Hydrologic Studies - I. W. Bauer, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"November was very dry with only a trace of moisture recorded at the meteorological station. In 1938 there was no precipitation recorded. There is still more moisture in the top 3 feet of soil than in the fall of 1943.

"Three terraces were built during the month, one of them double spaced.

"Visual periodic inspections will be made to see if this is feasible in this lower rainfall territory. The ground will be farmed on the contour. Flumes will be placed on the terraces to check the difference in runoff on the single and double spaced terraces.

Yields of corn on the plots were as follows:"

Contour			Straight			Subtilled	
Plot	Sample	Total Plot	Plot	Sample	Total Plot	Plot	Sample	Total Plot
6H	28.3	23.6	9H	45.4	37.6	10H 1/	31.3	24.1
7H	30.4	23.4	15H	33.4	27.6	20H 2/	23.7	16.0
						23H	27.4	22.9
Ave.	29.4	23.5	Ave.	39.4	32.6	Ave.	29.4	23.5

1/ Changed from strip crop to subtillage in spring.

2/ Due to planter trouble, a very poor stand was obtained, so result is omitted.

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"Rainfall was approximately 28 percent below the November 'normal' for the Throckmorton farm and about 16 percent below for the Dairy farm. There was only very slight runoff from any of the experiment watersheds.

"Mr. Bedell completed sample harvesting of corn from 64 plots on the Harper-Martin farm in Noble County and has compiled and analyzed the yield data for these and the 96 plots on the Throckmorton farm. The Noble County experiment is on land considered typical of the 'hummocky' land in northeastern Indiana. The plots are on sandy-loam soils with sandy-clay subsoils. Those on the Throckmorton farm are on silt-loam soils with poorly drained profiles and slopes of 0-2 percent.

"The following table summarizes the corn yields for the Noble County plots which had alfalfa meadow residue and those on the Throckmorton farm which had meadow residues predominantly timothy.

1945 Corn Yields from Crop Residue Management Plots
Bushels per Acre, (70 lbs./bu. at 17-1/2% Moisture

Plots tillage treatments	Timothy residue 1/ Throckmorton Farm		Alfalfa residue 2/ Harper-Martin Farm	
	125# Fert.	500# Fert.	125# Fert	500#Fert.
1 None prior to seeding	12	28	10	27
2 Surface residue, tillage 3"	17	41	24	26
3 Surface residue, tillage 6"	36	73	27	40
4 Mixed residue 3", tillage 3"	43	63	45	60
5 Mixed residue 3", tillage 6"	50	68	47	71
6 Mixed residue 6", tillage 6"	47	66	42	65
7 Turned under 7"	68	82	76	72
8 Turned under 4"	53	70	66	66

1/
Average from 3 replications.
Significant differences in yield:

	5% level	1% level
(a) Tillage treatments	10.3 bu.	14.3 bu.
(b) Fertilization rate	4.5 bu.	6.6 bu.
(c) To compare a tillage treatment at one fertilization rate with a different tillage treatment at a different fertilization rate.	15.4 bu.	21.2 bu.

2/
Average from 4 replications.
Significant differences in yield:

	5% level	1% level
(a) Tillage treatments	7.7 bu.	10.5 bu.
(b) Fertilization rate	8.2 bu.	11.1 bu.
(c) To compare a tillage treatment at one fertilization rate with a different tillage treatment at a different fertilization rate.	9.7 bu.	13.1 bu.

"Effects of mulch tillage treatments on yield compared with plowing may be observed from the following table showing statistical significance of difference in yield:

Statistical Significance of Yield Effects of Various Tillage Treatments, Compared to Plowing 7 Inches Deep with Same Fertilization, 1945

Plot treatment	Timothy residue Throckmorton Farm				Alfalfa residue Harper-Martin Farm			
	125#. Fert.		500# Fert.		125#Fert.		500#Fert.	
1 None prior to seeding	High	Sig.	High	Sig.	High	Sig.	High	Sig.
2 Surface residue, tillage 3"	"	"	"	"	"	"	"	"
3 Surface residue, tillage 6"	"	"		Sig.	"	"	"	"
4 Mixed residue 3", tillage 3"	"	"	High	Sig.	"	"	"	"
5 Mixed residue 3", tillage 6"	"	"		Sig.	"	"	---	---
6 Mixed residue 6", tillage 6"	"	"	High	Sig.	"	"	---	---
8 Turned under 4"	"	"		Sig.		Sig.	---	---

"Plowing to 7 inch depth produced significantly higher yields than all other tillage treatments at both fertilization rates on the Throckmorton farm and with 125 lbs. fertilization on the Harper-Martin farm; but not significantly higher than 4 inches plowing, residues mixed to 6 inches, nor 3 inches mixing of residues with 6 inch depth of tillage on latter experiment with 500 lbs. fertilization.

"Comparison of the same locations of residues and 3 inch and 6 inch depths of tillage shows significant advantage of deeper tillage with surface mulch on the Throckmorton farm at both levels of fertilization but not on the Harper-Martin farm. In the case of 3 inch mixing of residues, deeper tillage produced a significantly higher yield with higher fertilization in both experiments; but not at the lower fertilization level. Seven inch depth of plowing produced significantly higher yields than 4 inch depth of plowing with both high and low fertilization on the Throckmorton farm and greater effect with the lower fertilization and a significant difference only with lower fertilization on the Harper-Martin farm.

"Comparing surface mulch with 3 inch mixing, both with 3 inch depth of tillage, shows highly significant yield increases with mixing of residue in all cases.

"The effects of tillage on yields were materially influenced by differences in stands resulting from mechanical difficulties of the planting, especially on the #1 plots with no prior tillage. Improvement of the planting equipment for operation through residues and in hard ground is feasible and may be expected to reduce the effects of tillage depth and location of residues indicated by this first year's results. Variations in season will also likely materially influence the eventual results of the experiments.

"All plots at Throckmorton were fertilized with 0-14-7 at seeding, in bands about 3 inches below and 2 inches one side of the seed. Half received 125 lbs. and half 500 lbs. for each tillage treatment.

"Highly significant differences occurred between 500 lbs. and 125 lbs. fertilization rates for all tillage treatments with timothy residues. Differences were greater for shallow mixed and surface mulched plots than those tilled to 7 inches.

"Alfalfa residue plots on the Harper-Martin farm showed significant increases in yield for the 500 lbs. application, 3-12-12, on all mixed residue and surface residue plots. No significant differences occurred on the plowed plots. The difference between plots plowed to 7 inch depth with 500 lbs. fertilizer applied and all of the mixed and surface residue plots with 125 lbs. exceeded 13.1 bushels, indicating a highly significant interaction between rate of fertilization and cultural practice."

(Note: It was reported in our October summary that "Yields are on basis of 70 lbs. per bu. at 15 percent moisture." The 15 percent mentioned should be changed to 17-1/2 percent.)

Hydrologic Studies - R. G. White, East Lansing, Michigan.-"On Saturday, November 3, a 10-minute radio program was presented over station WJR (broadcasted by remote control from Michigan State College campus) relative to Soil Conservation Research in Michigan. A question-answer type program was presented with Marshall Wells, Farm Editor of WJR and Robert G. White participating. The program was built around the aims and objectives of the Michigan Hydrologic Research Project, with some data being presented relative to runoff and soil loss."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.- "Mr. Donnelly made 62 tests on the rectangular spillway outlet during the month to determine the best angle of the wingwall with respect to the centerline of the outlet and the best slope of the top of the wingwall. The tests showed, in most cases, that the angle with the centerline should be 60° and the top slope should be 45°. Other combinations showed equally good results for some tests, but the 60°-45° combination is the best combination for all the tests performed to date. The position of the longitudinal sills located on the floor of the outlet is now being investigated to see if their best location from the structural standpoint coincides with a satisfactory location from the hydraulic point of view.

"Mr. Anderson has placed 10 additional piezometers on the 4-1/2 inch diameter lucite pipe bleeder model in order to secure a more detailed record of the pressure variations in the barrel. There are now 15 piezometers in the barrel - 8 on the bottom and 7 on the top - as well as 4 in the riser. Only one rate of flow, 0.46 c.f.s., was used for the tests made during the month. At this flow the barrel at different times flows partly full as in open channel flow and seals off to flow full. The phenomenon that seals off the barrel and makes it flow full has been subjected to detailed study in an effort to discover its characteristics. Simultaneous recordings of the flow conditions were made by pressure recorders connected to the piezometers and by moving pictures. This has enabled Mr. Anderson to identify on the pressure records the flow .

conditions existing within the pipe. Even minor fluctuations have been traced to some change in flow conditions that can be observed in the movies. For example, when the pipe is sealed and the hydraulic grade line is below the barrel, small rises in the recorded pressures can be traced to the entrance of air into the riser and its subsequent passage down the barrel. This analysis has been made at intervals as short as 0.2 second.

"Mr. Blaisdell computed a backwater curve for a flow through the pipe bleeder of 0.46 c.f.s. under open channel conditions and studied the effect of reduced air pressures in the barrel on the backwater curve. These reduced pressures are caused by the water in the pipe dragging air along with it. The calculations were made as a result of comments made by Mr. Pierre Danel of Grenoble, France, during a recent visit here. They indicate that reduced air pressures can be of sufficient magnitude to affect the backwater curve. Errors in the stationing on the order of 5 percent were found for the curve computed when the reduced pressures were neglected."

Hydraulic Studies - D. D. Smith, McCredie, Missouri.-"A paper entitled 'Bluegrass Terrace Outlet Channel Design' has been completed and will be forwarded to Washington for publication approval within the next few days.

"Of the three outlet channels seeded this fall only the Alta fesque channel has a stand that gives promise of a good cover for next year. One channel was seeded to brome grass and one to a mixture of redtop, timothy, bluegrass, and Reed's canary grass.

"The paper, 'Flood Control Aspects of Farm Ponds', by Mr. A. W. Zingg has received Washington publication approval. Mr. Zingg has revised a previous paper entitled, 'Analysis of Flood Runoff Data' for publication, and prepared an article on 'The Functional Design of Small Farm Reservoirs.'"

Hydraulic Studies - A. W. Marsh, Corvallis, Oregon.-"Calculations of last summer's irrigation data continues. Certain seasonal averages of all plots, checks and treatments may be of interest."

Water Applied	21.44 inches
Water Absorbed	15.61 inches
Average Head per Furrow	.0024 C.F.S.
Runoff	27.4 %
Infiltration Rate	.075 in/hr.
Infiltration Rate	1.79 in/day
Furrow Length	484 feet
Slope	1.85 %

Hydraulic Studies - Vito A. Vanoni, California Institute of Technology, Pasadena, California.-"Laboratory studies of the existing spillway at Bear Creek near Marianna, Arkansas, were carried out in the laboratory. The design flow for the structure is 3,545 c.f.s. The spillway has a circular crest about 130 feet long, and the chute contracts to 40 feet width in circular curves connecting the ends of the crest and the chute section. The laboratory studies showed that the walls of the existing structure were high enough to contain the flow even with disturbances caused by the rather abrupt contraction. The outlet of the structure was found unsatisfactory since no stilling basin had been installed. Progress was made on preparing a preliminary report of the conclusions and recommendations resulting from the study.

"Report TR-76-CF-R-1 entitled, 'Hydraulic Model Tests of Lake Davy Crockett' was completed and copies were sent to the Fort Worth office, to the Office of Research, Washington, D. C.; and to the Research project at Minneapolis. Copies of this report are available for loan to people within the Soil Conservation Service."

Sedimentation Studies - Carl B. Brown, Washington, D. C.-"A paper was prepared on 'The Practical Aspects of Protecting Storage Reservoirs by Soil Conservation' for the December 13 meeting of the Washington Chapter of the Soil Conservation Association of America. The theme of this paper was to show physical and economic limitations on the control of reservoir silting by soil-conservation programs on reservoir watersheds. It was shown that the principal factors governing the feasibility of reservoir-silting control are: (1) the rate, character and sources of sediment production from the watershed; (2) the capacity-watershed ratio; (3) the relative value of dam sites depending on the scarcity of sites and life expectancy of dams; (4) the time required for application of the soil-conservation program; and (5) the economic pressure of the discount rate in computing the present worth of deferred benefits.

"A statistical analysis to determine the relationship of watershed and reservoir conditions to rate of sedimentation in 43 stock ponds on the LU-SD-2 Project, Pierre, South Dakota, was completed. The results, based on sedimentation surveys of 18 representative reservoirs, indicate that reservoir sedimentation, $S = 0.0573C + 0.0029W + 0.0125D + 0.2283T - 2.1194$, where:

S = Total sediment accumulation in acre-feet
C = Capacity of pond in acre-feet
W = Net watershed area in acres
D = Drainage density in feet per acre
T = Age in years

The four factors - capacity, net watershed area, drainage density and age - account for 93 percent of the variability of sedimentation. Of these, drainage density is the least important, accounting for only 3 percent of variability. Most important factors in reservoir sedimentation

in this area are age and net drainage area accounting for 82 percent of variability. No variability was found which could be related directly to the capacity-watershed ratio, an important factor in determining the trap efficiency of reservoirs. Presumably, practically all of the sediment carried into the ponds is deposited even in ponds having very low capacity-watershed ratio which, in more humid regions, would trap probably less than half of the total incoming load. Carrying the analysis farther to determine the useful life of the ponds, e.g. to determine the number of years required before sedimentation will reduce the dependable storage so as to cause failure of the supply once in every 5 years expectancy showed that most of the ponds had a useful life of from 25 to 75 years from date of original construction. Sedimentation in 6 of the 18 ponds, after being in operation about 8 years, is encroaching upon the dependable storage and 1 or 2 of these will not now store enough water to maintain a supply of even mild drought conditions."

Sediment Studies - Vito A. Vanoni, Cooperative Laboratory, California Institute of Technology, Pasadena, California.-"Sediment transportation studies were continued in the 10-inch flume using a sand with an average diameter of 0.55 mm. The principal objective of these tests is to determine the value of the friction factor of the bed as a function of the rate of sediment transportation. This information is necessary in order to apply the results to field problems.

"The analysis of the problem of the control of the Pacheco Creek in San Benito County near Hollister, California, has proceeded to the point where some pertinent conclusions are possible. Practically all of the sediment carried by this stream in the past two seasons was deposited in a newly excavated channel and could, therefore, be measured rather accurately. This measured amount of sediment transported was considerably less than that obtained by applying the sediment transportation formulas to the known flood discharges of the stream. The discrepancy was explained by the action of several obstructions in the channel caused by vegetation-covered bars, clay dikes, and a pipe line crossing. These obstructions acted as weirs, causing rather sudden drops which dissipated appreciable energy in turbulence that was not effective in transporting sediment. The calculations showed that about one-half of the total energy was consumed at these obstructions, and that, therefore, only one-half of the total energy was available to transport sediment.

"This is the first time that such measurements have been made. It has never been realized that such a large fraction of the total energy could be absorbed by obstructions, and therefore, be made unavailable to transport sediment. This finding is considered to be of major importance. It suggests the urgent need for continuing such studies in a systematic manner on other streams where opportunity to measure the sediment load is present."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"In connection with the irrigation studies on the Rockdale soils, arrangements were made with the DeGeorgio Corporation of Peters, Florida to obtain their rainfall data. I have set up a standard rain gage at the corner of Mowry and Redland and will use the Station data. Through the use of these three stations it is thought that some data might be obtained on the rise in water table for a given shower. On November 13 we had 2.49 inches of rain which gave a rise in the ground-water table on the wells 1/2 mile south and 1/2 mile north of the Station of 0.97 or about 3-3/4 inch rise in water table for each inch of rain.

"Although no actual work to date has been done on the study of intrusion of chlorides into marl land due to the fact that the equipment ordered has not arrived, I have been working with the chlorides with Dr. Westgate on those lands where contamination occurred due to the hurricane.

"Chlorides in all areas where runoff was possible dropped from 10,000 P.P.M. to almost nothing in most cases up to a week ago. Samples the past few days have indicated that where the land is drying out chlorides are again coming back slowly. How much it is impossible to ascertain but it is hoped that with the good head of fresh water we have this will be held down."

Drainage Studies - I. L. Saveson, Baton Rouge, Louisiana.-"Previous to my trip to Texas to conduct mole drainage experiments there, Irrigation Engineer Jack Griffin had made a topographical survey and compiled a contour map of the area on .2 foot interval. The proposed area is in the Balmorhea Soil Conservation District. The farm is new land recently put under cultivation, using border type of irrigation, approximately 30 feet between borders. Irrigation water is supplied by wells. The soil is Marfa clay loam. The topsoil is clay loam from 3 to 4 feet underlaid with a varying layer of impervious caliche. Under this layer is a coarse gravel of considerable depth. The area proposed for moling was in alfalfa and had been under cultivation for approximately 3 years; some spots showing the presence of salt. The crop rotation generally followed is from 3 to 6 years of alfalfa and 2 years of row crop. The problem in general is that the water used for irrigation contains saline salts which are deposited in the soil where there is lack of under drainage.

"After my arrival in Balmorhea on November 25, moling trials were started on approximately 12-1/2 acres of the area. In order to get the greatest fall for the mole drains it was necessary to cross the borders. The owner, Mr. Gene Hannon, made a point to put on the front of the mole machine to cut the borders. He had the necessary cutting and welding equipment on the farm. The point worked very well cutting the border sufficiently to let the mole beam through.

"It is the writer's opinion that moling is feasible and practical under these conditions for the following reasons:

(a) High investment in land.
(b) Definite drainage problem.
(c) High producing land.
(d) Tight clay soil adaptable to moling.
(e) Available outlets.
(f) There is a probable deep tillage benefit along with the drainage benefit.
(g) If moles will last for one rotation (5 to 7 years) they can be considered practical and moling could be considered a tillage practice. The re-moling work could be outleted into the previous gravel filled trenches, pulling the moles through this gravel filled trench without reconstruction of the outlets. On the basis of construction costs outlined above, if the moles lasted 5 years this would be a cost of $1.09 per acre per year.

"There will probably be construction difficulties to be overcome and we are listing the following recommendations for future work:

(a) Mole machine should be equipped with coulter to cut trash and alfalfa roots.
(b) Mole machine should be one which will cut a grade in order to install moles parallel to irrigation border, thus eliminating the following:

    (1) Cutting of the border which has to be rebuilt.
    (2) Making a ridge across the check where the moles are run, which is across the flow of irrigation water. This would eliminate the need of re-leveling after moling.

(c) Install watering device to lubricate the point of the mole machine to lessen power required and also construct a better mole channel. It is the writer's opinion that we will never get ideal moisture conditions for moling over an entire area due to the human element and varying physical conditions of soils.
(d) Moles should probably be run deeper than 18 inches since heavy machinery is used in land reconditioning. The weight of these machines may cause some mole failures.

"I left November 28, with District Conservationist J. H. Johnson for Fabens, Texas, to look over the proposed trials in the Rio Grande Valley.

"The problem in this area is similar to the one at Balmorhea, a salting out problem. However, soil and cropping conditions vary. In some locations the sand is close enough to the surface that deep plowing solves the problem. They are using the California plow, plowing 4 feet deep and

turning up enough sand to help the drainage. In other areas the s and is beyond the depth of this plow. These are the areas on which they wish to try moling. The outlets will be open ditches.

"A site was selected on the Davison farm with the following recommendations:

(a) Install a gravel filled trench over tile for an outlet.
(b) Tile 1 inch below the mole channel, not less than 30 inches deep.
(c) Install trench approximately 30 feet back from ditch so re-moles could be pulled through the gravel filled trench.
(d) Pull moles parallel to the borders since side fall is taken out of fields in this area. This fall will probably be 0.05 per hundred. This fall is less than is desired but is all that is available."

Drainage Studies - D. G. Miller, St. Paul, Minnesota.-"During this period Mr. Wiberg and I photographed and tested the 480 experimental concrete cylinders that were collected from the 8 peat-concrete installations earlier in the fall. These cylinders had been installed for 19 years and were of high strength 1-3 mixed concrete made of different brands of portland cement. Contrary to what was found in the concrete-alkali studies, the cement used does not seem to greatly influence the degree of resistance of the test cylinders. While the results of this year's tests have not been fully analyzed, it appears that even this high strength concrete lost strength in all the peats with losses averaging around 35 percent for the specimens in the more acid peats. This is for concrete with compressive strengths two and three times that used in the smaller drain tile. During 1946 we plan to test all the remaining 800 cylinders at the various locations including the 100 on the Watson place near Wilson, N. C. Among the 800 cylinders are 520 made of low strength mortars comparable in quality to that used in drain tile of the smaller sizes. The 1946 cylinders will have been installed 17 years when tested and are the last of the ones under observation in the concrete-peat studies. Judging from the tests at 10 years of cylinders from these mortar series, it appears that percentage looses in strength will be much greater than for the concrete specimens just tested. In all probability some of the low strength mortars will have just about completely disintegrated after exposures for 17 years."

Drainage Studies - T. W. Edminster, Blacksburg, Virginia.-"During the first 2 weeks Mr. Walker and Mr. Turner spent the major portion of their time in designing, constructing and adjusting the necessary equipment for field drainage operation.

"After several field trials in the vicinity of Blacksburg, they completed an anchor apparatus that made it possible to jack all sampling cylinders into the soil with a hydraulic jack. This method of sampling eliminates the danger of fractured and faulty soil samples that may occur under impact sampling.

"A collapsible funnel rack was developed to carry 12 units of the permeability equipment. This rack was designed to fold into a small place for ease in transportation between district offices.

"A number of special equipment carrying cases were constructed for transporting the special laboratory equipment. All such cases were lined with 1/2-inch sponge rubber to protect the equipment from vibration and breakage.

"On November 26, Mr. Turner, Mr. Walker, and I took all equipment to the Peanut District at Suffolk, Va. On the 27th and 29th the above group was joined by Mr. Pfeiffer, District Soils Surveyor and Mr. C. M. Jones, District Conservationist, in a tour of the critical drainage areas. A number of sites were selected by the group for future sampling. On the 28th this same group, with the exception of Mr. Pfeiffer, took the first set of sample cores."

IRRIGATION DIVISION

Irrigation Measuring Devices - R. L. Parshall reports.-"At Price, Utah, I conferred with SCS officials relative to sand problems in connection with several canals and ditches. For two of these channels the problem is largely one of trapping out coarse gravel and cobble stones, some as large as 4 to 6 inches in diameter. The capacities of these channels are about 125 and 170 second-feet respectively, with steep grade at the proposed site of the sand-trap structure. A suggested design of a suitable sand trap has been prepared, based on the principle of the riffle-deflector vortex-tube type of trap. Both channels are quite narrow and the structures probably will be about 8 or 9 feet wide and 25 feet long, having four or five riffle deflectors with an equal number of short vortex tubes discharging into a header box alongside the wall of the main structure. A short sluice way, 15 to 20 feet long will accommodate the Independence trap but for the Price Canal the length will be about 250-275 feet with a 1 percent grade. This long sluice channel is a handicap and may prove to be a source of trouble in operation. It is proposed to provide in the design an auxiliary opening whereby a flushing stream can be diverted into this channel in the event of clogging with sand and cobble-stone. It was gratifying to learn of the improvement now under way in the use of the Parshall measuring flume for gaging the flow in canals and ditches."

Snow Surveys and Irrigation Water-Supply Forecasts - R. L. Parshall reports further attention to the forecast problem of the Animas River as based upon fall and summer flow data. His first conclusions were based on a series of years from 1926 to 1945, inclusive, which indicated a correlation of 90 percent for deviations of 25 percent or less. Later he found other flow data for this stream from the period of 1911 to 1925, with exception of 2 or 3 years, and when these data were considered, it was found that the overall correlation, 1911 to 1945, was about 80 percent for deviations of 25 percent or less.

San Joaquin Valley, Calif. Cooperative Investigation - Dean C. Muckel reports.-"Average percolation rates for the test ponds of the Wasco and Minter Field groups were computed for 15-day periods together with average rates on adjacent large areas. In practically all cases where information was available on test ponds and large areas of the same treatment and soil type, rates on the test ponds were much higher than those on the large areas. In many cases, however, there seems to be a definite relationship between the rates. Average rates by 15-day periods are now being worked up for the isolated ponds installed by the Bureau of Reclamation in Kern and Tulare Counties. Ponds which have received special treatments and which can not be duplicated economically on large areas are being omitted from the analysis.

"Average percolation rates by 15-day periods have been computed for the several isolated ponds operated by the Bureau of Reclamation in Kern and Tulare Counties. An indication as to whether percolation rates obtained on the small test ponds can be used on larger areas was obtained on Pond TP 3. This pond was equipped with a buffer strip for approximately 2 months. The rate averaged about 25 percent of that in the buffer strip. Previous borings showed considerable lateral movement from most of the small ponds, and it is assumed that the water percolating from the buffer strip prevented lateral movement of water from the inner pond.

"Two ponds containing decomposed cotton bolls have shown the highest percolation rates of any of this group of ponds. The bolls were floating on the water surface of one pond, and on the other they were spaded into the ground. Further tests are to be made to find out if the high rates can be duplicated on other ponds and also it is proposed to request the Regional Laboratory to run tests on cores containing cotton bolls. It was suggested that chemical analyses of the water entering and leaving the cores might indicate the reason for the difference in permeability. Analyses of the soil inside and outside the ponds containing cotton bolls are also to be made."

Fred C. Scobey reports during 1944 (the first year of observation for the new, small ponds operated by various agencies), there was a distinct trend on many ponds of a surprisingly uniform logarithmic rate of decline, that is, the rate halved every 14 to 16 days - say 2 weeks: If the rate or depth of percolation were 8 feet per day, then after 2 weeks it would be 4 feet and in another 2 weeks 2 feet. Some of these rates declined at a uniform logarithmic rate for several months. Where there was an increase in rate for some unknown reason, the rate of increase approximated the rate of decline, that is, it doubled every 2 weeks, approximately.

"During 1945 the rate of decline on the same ponds was not uniform among themselves nor at the 1944 rate. In most cases the rate declined (halved) in from 30 to 60 days, while many ponds held fairly constant for several weeks at rates of from 0.6 to 2.0 feet per day. After periods of rest (drying out) for even a few days, the rates usually began again at much higher levels.

"The possibility of declines because of colloidal soil slimes (dispersion of soil particles into a very fine division) suggested by me in 1944, is borne out by action of coagulents such as acids in cotton boll hulls."

Imperial Valley Drainage Investigations, California - Soil-moisture studies - Vladimir S. Aronovici reports.-"An investigation of possible short-cut methods for field moisture determinations was started. The alcohol method is being investigated and trials will be made. Other techniques such as that proposed by J. S. Popadakis in Soil Science, April, 1941, will also be tried. Some preliminary investigations, consisting of discussions with local radio technicians and letters to RCA

and Goodyear research laboratories dealing with radio frequency equipment, were started. It appears that radio frequency equipment will be costly but satisfactory. All those consulted recommend that the unit be purchased rather than built from parts. It is hoped that in the near future some cost estimates will be available. A 1,000 to 2,000 watt unit, apparently a desirable size, would cost in the neighborhood of from $300 to $600."

Efficiency of Irrigation Methods for Different Problem Areas - Oregon Reclamation Congress - E. C. Gwillim reports.-"I attended the meeting of the Oregon Reclamation Congress at Portland on November 26, 27, and 28. The meeting was well attended and a very excellent program had been arranged. A day was devoted to reports and discussions of soil-conservation districts in Oregon. District supervisors from the districts reported on the work done in their respective districts. Their reports were most favorable and the service they have received from technicians was highly praised. From the discussions it appeared that there is a sincere interest by representatives of irrigation and drainage districts which are not now in soil conservation districts. Superintendents of irrigation districts discussed ditch maintenance and weed control. They are particularly interested in weed and moss control and especially eradication of both by chemical processes and by oil burning. The Congress went on record as opposed to basin authorities generally and the Columbia Basin Authority in particular."

Evapo-Transpiration Losses Affecting Irrigation Practices - Salinas Valley, Calif. - Harry F. Blaney reports.-"Annual values for unit consumptive use of water were set up for various irrigated crops in the pressure area of Salinas Valley, as follows: Alfalfa, 37.7 inches; pasture, 31.9 inches; lettuce (double crop), 19.0 inches; beans, 17.0 inches; sugar beets, 21.0 inches; orchard, 24.0 inches; guayule, 20.0 inches; and grain, 16.8 inches. Unit consumptive use values for winter and irrigation seasons were set up for various agricultural crops in the Eastside, Forebay, and Arroyo Seco areas of Salinas Valley. These were forwarded to the State Supervising Engineer at Salinas for review."

Paul A. Ewing reports conferences at Salinas with State and county officials and at Watsonville with District Conservationist Seibert, following conclusion of the field work directed by the latter. Interviews on irrigation practice for specific crops were obtained for 84 fields. On the basis of these and data obtained from other sources, estimates of actual water applications were prepared which are expected to account for total water use in the area under study.

Hydrology Manual - H. F. Blaney reports.-"As a member of a sub-committee of the American Society of Civil Engineers on Evaporation, Transpiration and Consumptive Use, I compiled tables showing consumptive use by agricultural crops and native vegetation in the Western States."

Evaporation from Water Surfaces - California - Arthur A. Young reports.-"The Los Angeles County Flood Control District is making arrangements for adoption of my screened pan idea in some 20 locations throughout the county. For nearly 15 years the District has been obtaining records from pans of the same size as the screened pan and it is these that are to be converted. The reason given for the change is the demonstration of the low rate of evaporation from the pan as shown in my report on 'Evaporation Investigations in Southern California.'"

Study of the irrigation problem from a mathematical analysis approach - Willis C. Barrett reports.-"Considerable time was devoted to working out a mathematical solution and the making of diagrams and charts of the distribution of water in a border irrigation on a homogeneous soil. Some rather significant physical phenomena were demonstrated.

"Though the analysis is being worked out on a theoretical basis and independent of any field work, yet the first trial application to field data organized by both Mr. Marr and Mr. Criddle, from a quite different perspective, shows remarkable agreement. Contrary to what one would expect, the analysis is solving practical field problems far beyond my expectations. It is pointing the way to practical field investigations to prove its reliability in the analysis of some established field experiences that, to date, have not been satisfactorily explained. Approximately 100 pages of a report, in rough draft, were completed. The title of the paper will be: 'An Analysis of the Water Penetration Phenomena in Irrigation and a Proposed Method of Investigation for Determining the Proportion of the Variables in an Irrigation Run.'"